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ABSTRACT

This document presents information about the apprenticeship training program of Alberta, Canada, in general and the gas utility operator certificate program in particular. The first part of the document discusses the following items: Alberta's apprenticeship and industry training system; the occupation committee and its members; the Alberta Apprenticeship and Industry Training Board; safety education; legal and administrative aspects of safety; formal or technical training; and procedures for recommending revisions to the course outline. The second part of the document presents the course outline that details the following sections of the program and subject areas within the sections: (1) properties of natural gas; (2) general safety and emergency response procedures (general safety; emergency response procedures); (3) descriptive geometry and applied drafting mathematics (surveying and mapping; transmission and distribution systems; pipeline construction and inspection); (4) operation and maintenance of gas utility systems (corrosion control; operation and maintenance); (6) background knowledge (regulatory agencies and codes; industry advisory network); and (7) practical applications. Each section of the outline includes an anticipated outcome and series of behavioral objectives for each of the job tasks included for each subject area. (MN)

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OCCUPATION COMPETENCY PROFILE

Gas Utility Operator Certificate Program

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Gas Utility Operator

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Apprenticeship and Industry Training System

The Apprenticeship and Industry Training System provides for three different types of certification, Compulsory Certification in a Designated Trade, Optional Certification in a Designated Trade, and Certification in a Designated Occupation. Designated Occupation Certification is certification that an individual has completed and met the standards for an industry developed and managed training program in an Occupation Designated under the Apprenticeship and Industry Training Act.

An Occupation Competency Profile is developed by industry and approved by the Apprenticeship and Industry Training Board. Training can consist of on the job training, formal technical training, or a combination of formal and on the job training. Training may be available through industry employers, or public and private training institutions located in or out of Alberta. Training is not available through the Apprenticeship and Industry Training system. In order to obtain occupation certification a candidate must complete the training and meet the standards established by industry.

While the Alberta Apprenticeship and Industry Training system is a government program, it is driven by industry (a term which includes both employers and employees). The Alberta Apprenticeship and Industry Training Board steers the system, but the system relies on a network of industry committees representing the interests of over 50 trades and occupations. An Occupational Committee (OC) consisting of employer and employee representatives from the occupation develops occupation standards for occupational certification.

Occupation Committee (OC)

The Board establishes an Occupational Committee (OC) for each designated occupation and based on Occupational Committee recommendation, appoints a Presiding Officer and equal numbers of employees and employers for terms up to three years. Most Occupational Committees have nine members. Occupational Committees:

- Identify competencies for their occupation.
- Recommend the standards for certification to the Board.
- Establishing accreditation of training that meets the industry standards for the occupation.
- Make recommendations on all related matters pertaining to the designated occupation.

Gas Utility Operator Occupation Committee Members

Mr. G. Sweitzer	Edmonton	Presiding Officer
Mr. B. Budvarson	Edmonton	Employer
Mr. H. Gibson	Edmonton	Employer
Mr. B. Graham	Edmonton	Employer
Mr. C. Ross	Edmonton	Employer
Mr. A. Buwalda	Edmonton	Employee
Mr. K. Flynn	Edmonton	Employee
Mr. L. Frank	Peace River	Employee

The Alberta Apprenticeship and Industry Training Board (Board)

The 13 members of the government appointed Board are aware of the training and certification needs of those individuals working in designated trades and occupations and employers. Many Board members have previously served on an LAC (Local Apprenticeship Committee), PAC (Provincial Apprenticeship Committee) or Occupational Committees. The Board? responds to industry's needs and:

- sets training and certification standards in all trades and occupations.
- 3pproves the technical training to be delivered by training establishments
- 8ncourages the development of alternate methods of technical training delivery
- 6hakes recommendations to the Minister of Learning about the designation of trades and occupations
- 8reates LACs, PACs, OCs and appoints their members
- 3dvises the Minister on the labour market's need for skilled and trained workers

Safety Education

Safe working procedures and conditions, accident prevention and the preservation of health are of primary importance in industry training programs in Alberta. These responsibilities are shared and require the joint efforts of employers and employees. Controlling the variables and behaviors that may contribute to or cause an accident or injury can create safe learning experiences and environments. It is generally recognized that a safe attitude contributes to an accident free environment. Everyone will benefit as a result of a healthy safe attitude towards prevention of accidents. An individual in this designated trade or occupation may be exposed to more hazards than others in the work force. Therefore, these individuals should be familiar, and comply, with the Occupational Health and Safety Act and Regulations respecting personal safety and the safety in the work place.

Legal and Administrative Aspects of Safety

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer and employee.

Employer's Responsibilities:
The employer is responsible for:
- providing and maintaining safety equipment, protective devices and clothing.
- enforcement of safe working procedures.
- safeguards for machinery, equipment and tools.
- observance of all accident prevention regulations.
- training of employees in safe use and operation of equipment.

Employee's Responsibilities:
The employee is responsible for:
- working in accordance with the safety regulations pertaining to job environment.
- working in such a way as not to endanger themselves or fellow employees.
- safe use of all equipment and supplies provided by the employer

Formal or Technical Training

Formal training for occupations falls outside the administrative scope of Alberta Apprenticeship and industry Training. Formal training may be available through colleges and institutes in Alberta or outside the province. Contact Alberta Learning Apprenticeship and Industry Training, Industry Programs and Standards for more information.

Technical Training in the Gas Utility Operator occupation is available at the Northern Alberta Institute of Technology.

Procedures for Recommending Revisions to the Course Outline

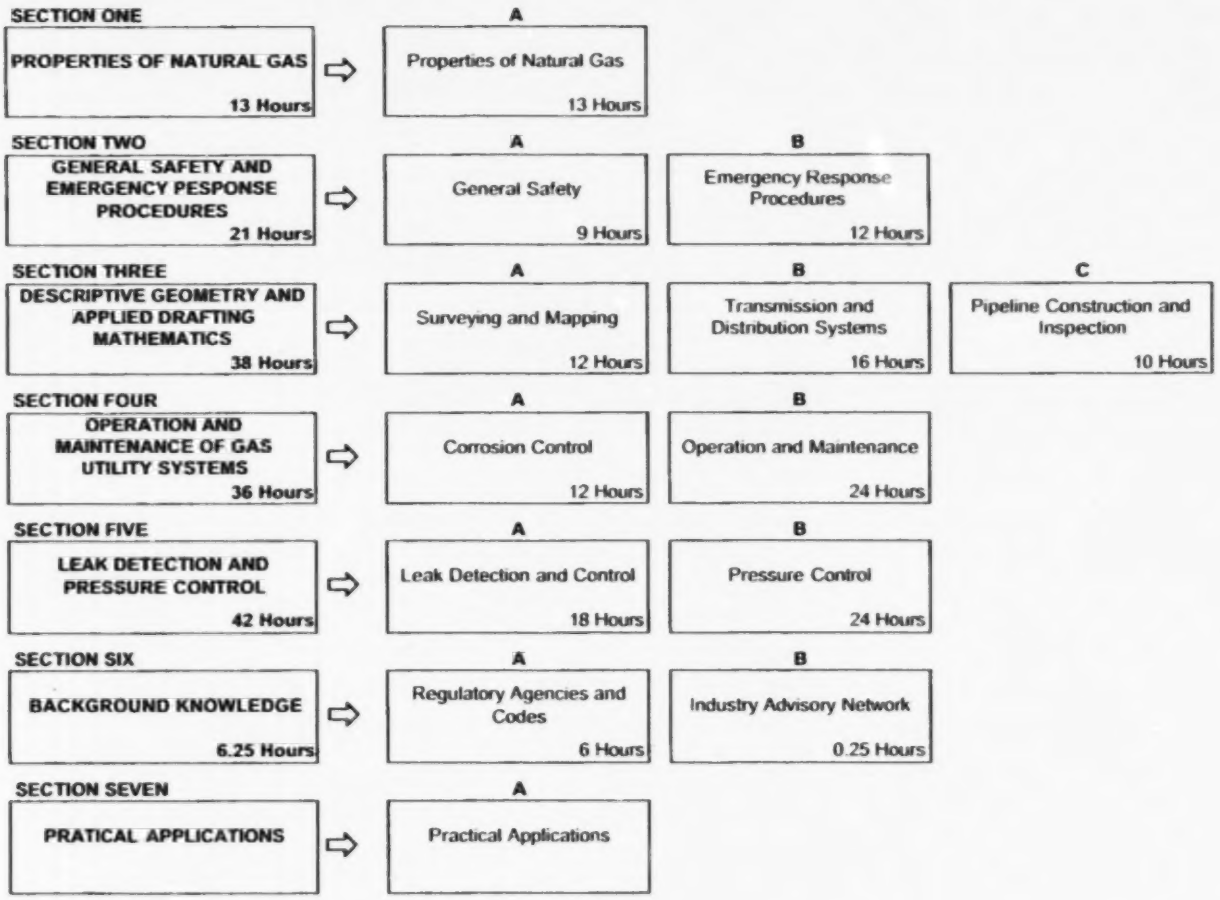
This course outline has been prepared by the Gas Utility Operators Occupation Committee in partnership with Industry Programs and Standards of the Apprenticeship and Industry Training Division of Alberta Learning. This competency profile was approved on November 1, 2002 under the authority of the Alberta Apprenticeship and Industry Training Board on a recommendation from the Gas Utility Operators Occupation Committee. Valuable input is acknowledged from industry and the institutions. Any concerned citizen or group in the Province of Alberta may make recommendations for change by writing to:

Apprenticeship and Industry Training
Industry Programs and Standards
10th floor, Commerce Place
10155-102 Street
Edmonton, AB T5J 4L5

It is requested that recommendations for change refer to specific areas and state references used. Recommendations received will be placed before regular meetings of the Provincial Apprenticeship Committee.

Gas Utility Operator Competency Profile

Formal Competency
(156.25 Hours)



Gas Utility Operator
Competency Profile

SECTION ONE..... PROPERTIES OF NATURAL GAS, ...13 HOURS

A. Properties of Natural Gas .....13 Hours

Outcome: ***Identify the properties of natural gas.***

1. Composition.
   a) identify natural gas chemical formula.
   b) describe the physical characteristics of different gases.
   c) identify gases based on their heat value.
2. Relative density.
   a) list the relative density of different chemicals.
   b) give the weight of different volumes of water.
   c) describe the properties of carbon monoxide.
3. Flame characteristics.
   a) describe the results of flame speed tests for different gases.
   b) describe the characteristics of combustion.
   c) describe the results of poor and adequate combustion, given a gas that is to be burned.
   d) identify the ignition temperature of different gases.
   e) describe the flame speed for different gases.
4. Range of flammability.
   a) describe the limits of flammability for different gases.
   b) describe what is meant by range of flammability.
5. Hydrocarbons.
   a) describe hydrocarbons.
   b) describe the combustion requirements for different gases.
   c) identify composition of butane, iso butane, propane, methane.
6. Math basics of metric and Imperial.
   a) convert temperatures from C to F, and back.
   b) convert inches to centimeters.
   c) convert meters to feet and back.
   d) convert psi to kpa.
   e) define gigajoules.
   f) convert cubic feet of gas to cubic feet of liquid.
   g) calculate dimensions
   h) use scaled drawings to calculate pipe requirements.
   i) demonstrate the use of scale rules.

SECTION TWO .....GENERAL SAFETY AND EMERGENCY RESPONSE PROCEDURES .....21 HOURS

A. General Safety .....9 Hours

Outcome: ***Describe general safety practices and procedures.***

1. Personal protective clothing.
   a) list the occasions when a worker is required to wear head protection, ear protection, eye protection, hand protection, foot protection, body protection, respiratory protection.
2. Fire extinguisher control.

a) identify the class of fire, given a flammable substance.
b) identify the types of fire extinguishers and their distinguishing characteristics.
c) describe the components of a fire triangle.

3. Occupational Health and Safety and other applicable regulations.
   a) identify situations that do or do not follow OH&S regulations.
   b) specify the intent of an OH&S regulation, given a working scenario.
   c) describe common injuries in the gas utility industry.
   d) describe the working alone regulation.

4. Electrical safety codes and regulations.
   a) identify Electricity and Gas Inspection Regulations for meter sets, transformers, regulators.
   b) identify requirements for burying power and gas in the same trench.
   c) identify where class 1 division 1 is required.

5. Main laying operations (trenching, shoring, soil).
   d) describe the requirements for excavation walls, based on method and soil type.
   e) describe the requirements for spoil piles.
   f) describe the process for crossing a foreign pipeline.
   g) describe the process for installing a pipeline.

6. Personal Injury Prevention.
   a) describe the prevention of slips and falls.

B. Emergency Response Procedures ..... 12 Hours

Outcome: ***Describe emergency response procedures.***

1. Emergency Planning.
   a) identify the response required, given an emergency scenario.
   b) list the agencies that have re-arranged emergency plans with gas utility personnel, Fire Department, Fire Commissioner, Department of Environment, Rural Fire Department.
   c) list the hazardous situations that require an emergency response.
   d) describe the after the fact debriefing report following an emergency.

2. Gas odour, CO call, and confined space entry.
   a) describe the appropriate response given a gas odour or Carbon Monoxide situation.
   b) describe the procedure to be followed when taking readings with detector equipment.
   c) describe the procedure for confined space entry.

3. Pipeline repairs.
   a) explain the requirements and process for emergency repair, temporary repair, permanent repair.
   b) identify Alberta 1st Call.
   c) describe the process and timing requirements for pressure tests on different pipeline lengths.
   d) describe the procedure for responding to sensitive customers, greenhouses, hospitals, etc,.
   e) describe the requirements for securing an area.

4. Public relations and dealing with the public, RCMP, Fire Department, Media, Department of Environment.
   a) describe the use of accurate and current plans for emergency support services.

5. Standard operating procedure.
   a) describe the application of an operations and maintenance manual.
   b) describe the responsibilities of these agencies: Provincial Gas Inspection, Safety Codes Council, Private Agencies, Electrical Protection Branch.
   c) describe the intent of good operating and maintenance practices.

6. Disaster service emergency preparedness planning.
   a) describe a plan of action for utility conduct during a disaster.

7. Legal and administrative aspects.
   a) describe the responsibilities of these agencies: Rural Gas Act, Federal and Provincial Codes, Canadian Gas Association, Canadian Standards Association, Utilities and Telephones, Public Utilities Board, E.R.C.B., ULC.

SECTION THREE ..... PLANNING, FABRICATING AND INSTALLATION OF GAS UTILITY SYSTEMS ..... 38 HOURS

A. Surveying and Mapping ..... 12 Hours

Outcome: ***Demonstrate surveying and mapping skills.***

1. Interpretation of maps and plans.
   a) describe the features of a plot plan.
   b) describe the grid system used in Alberta.
   c) describe the location and function of survey pins.
2. Interpretation of land rights and easements.
   a) describe the purpose and functions of easements.
   b) describe all the requirements that must be met before construction of distribution systems or pipelines can commence.
   c) describe right of way.
   d) describe interpretation of title by designation.
3. Global positioning.
   a) describe the use of a satellite for position locating.

B. Transmission and Distribution Systems (Regulating, Metering, Odour Sets) ..... 16 Hours

Outcome: ***Describe transmission and distributing systems.***

1. Installation procedures.
   a) requirements that must be met to activate a gas line.
   b) follow engineering and manufacturer specifications.
   c) follow guidelines for pipeline installation.
   d) understand limitations of work that can be conducted by a gas utility operator.
2. Distribution system.
   a) describe the pertinent statutes that impact the design, construction and operation of distribution systems.
   b) describe the factors that must be considered when sizing gas pipelines.
3. Flow and calculations of mains.
   a) explain the reason for using coincidence factors.
4. Codes and Regulations.
   a) given a scenario regarding any topic, indicate the pertinent requirements based on Codes and Regulations.
   b) the jurisdictional areas of all Code and Regulatory bodies.
5. Pressure control at all stations.
   a) requirements for pressure control for intermediate stations.
   b) rationale for different components e.g., relief valves.
6. High pressure control.
   a) describe the operational characteristics of high pressure pipelines.

C. Pipeline Construction and Inspection ..... 10 Hours

Outcome: ***Describe pipeline construction and inspection.***

1. Tools and materials (material testing).
   a) the characteristics of different materials based on their design and composition characteristics.
   b) the uses of different tools and materials.

2. Design factors and plastic fusion.
   a) the types of plastic pipes and where they may be used.
   b) describe the process for testing plastics.
   c) describe the design restrictions regarding plastic pipes and tracer wire.
   d) describe High Energy Joining procedures.
   e) describe destructive and non-destructive tests.

3. Flaring and purging.
   a) describe the requirements and processes involved during pipeline abandonment.
   b) describe the requirements and procedures for purging and flaring a new system.

4. Environmental considerations
   a) identify regulation requirements in accordance with surface rights or environmental legislation

SECTION FOUR ..... OPERATION AND MAINTENENCE OF GAS UTILITY SYSTEMS ..... 36 HOURS

A. Corrosion Control ..... 12 Hours

Outcome: ***Describe the operation and control of gas utility systems.***

1. Principles of galvanic corrosion.
   a) describe the location and process of galvanic corrosion.
   b) describe the methods for overcoming galvanic corrosion.
   c) compare different metals according to their potential for galvanic corrosion.

2. Cathodic protection.
   a) describe the location and process of cathodic protection.
   b) describe the name and functions of the different components related to cathodic protection.
   c) describe anodes and rectifier beds.

3. Monitoring corrosion control systems.
   a) describe the process of corrosion control systems.
   b) describe measurement techniques related to corrosion control systems.
   c) describe trouble shooting techniques related to corrosion control systems.

4. Corrosion prevention practices.
   a) given a situation, describe the applicable process to follow for corrosion prevention.

B. Operations and Maintenance ..... 24 Hours

Outcome: ***Identify the operations and maintenance of gas utility equipment.***

1. Tools, valves and equipment.
   a) describe the function of different tools, equipment and supplies related to operations and maintenance.

2. Pipeline repair, bell holes, hot tapping, static electricity.
   a) describe the line location equipment and the process used to locate pipelines for repair.
   b) describe the procedures for digging bell holes.
   c) describe hot tap procedures.
   d) describe the dangers of static electricity in a repair situation.

3. Odourization testing.
   a) describe the uses, characteristics and requirements for gas odourants.
   b) describe the process used in conducting underground gas line odour surveys.
   c) describe the reasons for conducting natural gas surveys.
   d) describe the percentage concentration requirements for odourization.

4. Leak surveys to meet code regulations.
   a) describe the use of meters for leak surveys.

b) describe surface sampling.
c) describe sub-surface sampling.
d) list the frequency of surveys.
e) describe aerial patrol surveys.
f) describe the reasons for conduction natural gas surveys.

5. Report and record keeping.
   a) describe the procedure for leak repair inspection reports.
   b) describe the use of a daily diary.

6. Public relations (report writing, recording work orders, etc.).
   a) list the requirements of a detailed work order.
   b) list the requirements of progress reports.
   c) describe customer notification procedure for a planned outage, emergency outage.

SECTION FIVE..... LEAK DETECTION AND PRESSURE CONTROL .....42 HOURS

A. Leak Detection and Control .....18 Hours

Outcome: ***Describe leak detection and control.***

1. Tools and equipment.
   a) describe the use of instruments for leak surveys
   b) describe the characteristics of combustible gas indicators.
   c) describe the instruments that are used for surface sampling surveys.
   d) describe the rationale and process for instrument calibration.

2. Odourization.
   a) describe the methods involved and rationale for odourization processes.
   b) describe odourization levels.
   c) describe the percentage concentration requirements for odourants.
   d) describe odor control methods.

3. Common causes of leaks.
   a) describe causes of leaks in P.E. pipe.
   b) describe causes of leaks in steel pipe.
   c) describe causes of leaks in aluminium pipe.
   d) describe causes of leaks by wild life, rodents, poor workmanship, corrosion.

4. Pinpointing leak locations.
   a) Pressure lose monitoring.
   b) describe the indicators of possible leaks.
   c) describe the use of bar holes.
   d) describe crop conditions in relation to leaks.
   e) describe process for leak locating in a confined area.
   f) describe how elevation affects pinpointing a leak.
   g) describe pavement or frost caps and leak locations.

5. Report and record keeping.
   a) list proper documentation procedures.
   b) describe the use of a camera for documentation.

B. Pressure Control.....24 Hours

Outcome: ***Describe pressure control.***

1. Meter reading – AMR.
   a) describe the devices and their functions used for measuring natural gas.

b) describe the advantages to the different types of commercial meters.
c) describe the process used in meter reading.
d) calculate hourly gas consumption based on dial movement.

2. Pressure control regulators and relief valves.
   a) list and describe the types of basic regulators.
   b) list the components and functions of relief valves.
   c) describe the physical laws that describe how and why regulators work.
   d) list the requirements for sizing and venting of relief valves.

3. PFM
   a) describe the setting requirements for PFM sets.
   b) describe pressure correction factor.
   c) describe the functions of regulators.
   d) describe the functional purpose for installing gas regulating equipment.
   e) describe how to calculate cfm.

4. Codes and regulations
   a) list the regulations pertaining to measurement accuracy, verification and re-verification of installations.

5. Intermediate regulating station.
   a) list the design considerations for the location of regulator stations and isolation valves.
   b) describe the requirements for regulator station buildings.
   c) describe fencing requirements.
   d) list monitor regulator functions.

SECTION SIX.....BACK GROUND KNOWLEDGE.....6.25 HOURS

A. Regulatory Agencies and Codes.....6 Hours

Outcome: ***Identify regulatory agencies and control.***

1. Regulatory Agencies.
   a) Agencies.
   b) identify their scope of responsibilities.

2. Applicable Acts, Regulations and Codes.
   a) identify acts, regulations and codes that apply to a given situation.
   b) identify their scope of responsibilities.

B. Industry Advisory Network ..... 0.25 Hours

Outcome: ***Describe the role and purpose of the industry advisory network and the occupation committee for gas utility operators.***

1. Role and purpose of the industry advisory network

SECTION SEVEN .....PRACTICAL APPLICATIONS

A. Practical Applications

1. Flare stack purging.
   a) identify safe discharge locations.
   b) identify operating procedures.

2. Hot tapping
   a) use tools and equipment to perform hot tapping operations.
   b) test hot tap and leave installation in safe operating condition.

3. Cathodic protection.
   a) use specialized instruments for survey or maintaining cathodic protection.
   b) identify anode locations.
   c) identify test sites.
   d) identify anodeless risers.
   e) identify rectifier beds.

4. Corrosion.
   a) identify piping exposed to the elements.
   b) identify poly tape and primer use.
   c) identify problems associated with no corrosion protection.

5. Leak detection.
   a) identify leak locations using line locators.

6. Line Locator.
   a) pin locator.

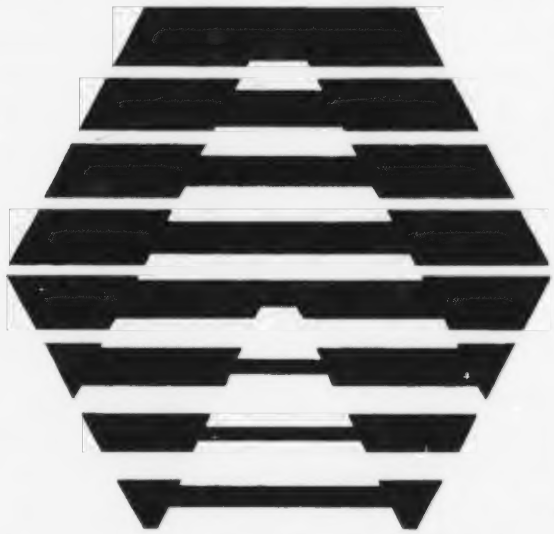
7. Fire safety.
   a) use hand held fire extinguishers.

8. Breathing apparatus.
   a) identify air filter applications.
   b) prepare the equipment.
   c) don the cylinder and the face piece.
   d) connect the breathing tube.
   e) perform alarm check.

9. Detection devices.
   a) perform a pre-service check.
   b) operate the detector.
   c) take a reading.
   d) identify electronic devices.
   e) identify manual devices.
   f) complete a CO test.
   g) complete a H_2S test.

10. Troubleshooting regulators.
    a) perform routine maintenance procedures on different styles of regulators and attachments.
    b) set and adjust pressure regulators.
    c) set and adjust relief valves.

11. Tools demonstration.
    a) list and describe workmanship, safety, and correct operational procedures associated with power hand tools used by the Gas Utility Operator.
    b) demonstrate safe use of hand and power tools used by the Gas Utility Operator.



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